

Appendix J – Water Resources Technical Report

- Water Resources Technical Report (Kimley-Horn, 2013)

Water Resources

Introduction

Purpose of Report

This *Water Resources Technical Report* has been prepared in support of the US Highway 53 (US 53) Virginia to Eveleth Draft Environmental Impact Statement (Draft EIS). The objective of this report is to evaluate the potential water resource impacts caused by each project alternative. This report identifies:

- Potential waterbody impacts (Rouchleau Pit and area streams)
- Potential wetland impacts of the project and potential mitigation options

Project Background

Since May 1960, the Minnesota Department of Transportation (MnDOT) has operated a segment of US 53 on an easement granted by United States Steel Corporation (now RGGS Land and Minerals Co.). This roughly one-mile segment of US 53, from approximately 2nd Avenue West to Vermillion Drive in Virginia, is subject to iron ore mining rights held by RGGS and Cliffs Natural Resources (United Taconite Division)—the mine's owner and operator, respectively. Under the 1960 easement terms, MnDOT agreed to relocate US 53 upon notice from the mine owner/operator.

On May 5, 2010, United Taconite (UTAC)¹ provided notice to MnDOT that the 1960 easement rights would be terminated. MnDOT has negotiated with RGGS a May 2017 date as the deadline for vacating the highway, after which time RGGS and UTAC may proceed with mining activity into the area currently occupied by US 53.

Project Alternatives

The final Scoping Decision Document (SDD), distributed in September 2012, provided a summary of the Scoping process findings and documented the proposed scope and focus of the EIS. Four alternatives were proposed for detailed study in the Draft EIS: No Build, Existing US 53, M-1, and E-2 Alternatives. An Amended Scoping Decision Document (ASDD) was completed in September 2013, adding one additional alternative to be studied in the Draft EIS, Alternative E-1A (Figure 1).

Some Scoping alternative alignments that had been dismissed from further consideration in the Draft EIS during the 2012 Scoping process (specifically Alternative W-1) were reconsidered with minor alignment modifications (W-1A). The W-1A alignment was dropped from further consideration, in part due to resource impacts. The W-1A wetland impacts are documented in this report, in addition to the alternatives to be evaluated in the Draft EIS (Figure 2).

No Build Alternative – Closure of the Easement Segment of US 53

The No Build Alternative would respond to the easement terms by closing the easement segment of US 53, resulting in traffic being rerouted to existing highways. Signage would be used to officially mark the rerouting of US 53, which would follow existing roadways to the west of US 53: MN 37, Saint Louis County Road 7 (Co. 7), and US 169. This alternative provides a basis for comparison with other alternatives, and proposes no physical changes to the corridor other than vacating the easement.

¹ United Taconite (UTAC) is a division of Cliffs Natural Resources, Inc. UTAC operates the mine on behalf of the land and mineral owner, RGGS Land and Minerals Co. For brevity, most references in this document will refer simply to "UTAC."

Existing US 53 Alternative

The Existing US 53 Alternative, though not in compliance with the terms of the existing easement, would keep US 53 in place and open to traffic by addressing the economic, legal, or engineering issues associated with resolving the terms of the easement agreement. The State of Minnesota would not vacate US 53 but would keep the highway open.

If an agreement could be reached, this alternative assumed incorporating construction of grade separations or other highway modifications to allow for reduced right-of-way area and accommodate mine operations on both sides of US 53.

Alternative M-1

This alternative would mostly follow the grade created by the now backfilled Auburn Pit through the UTAC mine. As shown in Figure 1, Alternative M-1 would cross a mine operations area that will be active for many years. This alternative would involve construction of up to two miles of new highway, terminating west of 2nd Avenue, with earthwork and structures required for continued mine operations on both sides of the new alignment. Local roads at each end of the alternative would also be reconstructed to maintain community access.

Alternative E-1A

From south to north, this alternative diverges from existing US 53 just north of Cuyuna Drive. The alignment crosses MN 135 between the existing interchanges of US 53 and Bourgin Road. The new alignment then continues parallel to Bourgin Road before turning to the northwest to cross the Rouchleau Pit along an existing submerged haul road embankment. After crossing the pit, the alignment turns to the southwest to reconnect with existing US 53 beyond 2nd Avenue (see Figure 1).

Alternative E-2

This alternative extends US 53 north of its existing location in order to cross the Rouchleau Pit at one of the pit's narrow openings (see Figure 1). Access at 2nd Avenue and MN 135 would be maintained in approximately the same locations. This alternative is located outside of the UTAC permit to mine area.

Alternative W-1A (not to be studied in Draft EIS)

This alternative follows existing highways MN 37 and Co. 7. These routes are both existing two-lane highways, which could provide a portion of the right of way needed to develop a four-lane highway. The modified alternative completely avoids areas with mining rights.

Regulatory Context/Methodology

Regulatory Context

The following agencies are responsible for regulation, review, and/or permitting of surface water related issues within the study area resulting from construction of the project:

- United States Army Corps of Engineers (USACE), under the purview of the US Environmental Protection Agency (USEPA)
- Minnesota Pollution Control Agency (MPCA)
- Minnesota Department of Transportation (MnDOT), under the purview of the Board of Water and Soil Resources (BWSR)
- Minnesota Department of Natural Resources (MnDNR)

United States Army Corps of Engineers

Navigable waters are regulated under Section 10 of the Rivers and Harbors Act (RHA) of 1899 and Section 404 of the CWA. Section 404 of the Clean Water Act (CWA) established a program to regulate the discharge of dredged or fill material into Waters of the United States, including those wetlands that are not isolated hydrologically on the landscape.

Section 404 of the CWA is implemented by the USACE under the purview of the USEPA. Section 404 of the CWA requires a permit to be issued by the USACE prior to the placement of any dredged or fill material into any Waters of the United States, including wetlands. The USACE is responsible for administering the day-to-day of the Section 404 permitting program (including individual and general permit decisions), conducting Final or Preliminary Jurisdictional Determinations, developing policy and guidance, and enforcing all other Section 404 provisions.

Minnesota Pollution Control Agency

The MPCA establishes state water quality standards and conducts periodic water quality and biological monitoring. Water quality standards are implemented primarily through National Pollution Discharge Elimination System (NPDES) permits issued to dischargers (MN 115; MN Rule Chapters 7001, 7090).

Section 401 of the CWA requires the affected state to issue a water quality certification, or a waiver, for each Section 404 permit. The MPCA reviews USACE permits and is responsible for issuing Section 401 water quality certification (MN 115; MN Rule Chapter 7001).

Minnesota Department of Transportation

The Minnesota Wetland Conservation Act (WCA) of 1991, under the purview of the Minnesota Board of Water and Soil Resources (BWSR), establishes the goal of no net loss of wetlands (MN Rule Chapter 8420). MnDOT acts as the local government unit (LGU), for its projects, in coordination with the local agencies, which in this case includes Saint Louis County Planning and Community Development and the North Saint Louis Soil and Water Conservation District. The WCA requires that anyone proposing to drain or fill a wetland must try to avoid disturbing the wetland. If avoidance cannot be achieved, the WCA requires that impacts be minimized to the extent possible. Wetland replacement must replace the public value of wetlands lost as a result of an impact.

Minnesota Department of Natural Resources

Wetlands are regulated by the DNR if they are identified as public waters or public waters wetlands. Public waters/wetlands are all water basins and water courses that meet the criteria set forth in Minn. Stat., Section 103G.005, subd. 15, and that are identified on Public Water Inventory (PWI) maps (Minn. Stat., Section 103G.201). Proposed impacts involving a change in the course, current, or cross section of public waters/wetlands would require a permit from the DNR (MN Rule Chapter 6115). This same rule chapter requires an appropriation permit from the DNR for groundwater or surface water pumping.

On behalf of the Federal Emergency Management Agency (FEMA), the DNR in conjunction with the local government units (cities, watersheds) also manages activities that may impact floodplains associated with DNR waters/wetlands, including activities such as construction, excavation, or deposition of materials over or under waters which may affect flood stage, floodplain, or floodway boundaries.

Methodology

Study Area

The study area for water resources included land adjacent to the project alternatives to be studied in the Draft EIS, generally extending out 500 feet or more. The estimated construction limits were defined

for each alternative, and they are reflected in Figure 1. For the Build Alternatives, the estimated construction limits consist of the existing right-of-way in some areas and a varying corridor throughout the rest of the alignments. For the Existing US 53 and No Build Alternatives, the existing right-of-way was generally used as the construction limits.

For Alternative W-1A, the estimated construction limits consisted of an approximately 200-foot wide corridor throughout the alignment (Figure 2).

Inventory Methods

The water resources were identified based on current digital data and a field review. Surface waters and streams were identified from the DNR PWI.

Wetlands were identified based on current digital data from the U.S. Geological Survey (USGS), the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), web soil data for hydric soils (<http://websoilsurvey.nrcs.usda.gov/app/>), and field review of wetland areas to verify photo signatures of plant communities (USDOI, 2012; USFWS 1974-1988; DNR, 1983). Wetland boundaries were verified by a field review of wetland areas for general wetland types and characteristics, conducted on June 20-21, 2012, by photointerpretation, and by review of digital data. It is assumed that all identified wetland areas, including those that may have been disturbed or created as a result of prior mining or grading activities, would be regulated if impacted.

Each wetland identified was given a unique identification number and the total basin size was estimated. During the field review, approximately 90 percent of the wetland areas were reviewed to determine the dominant plant community/wetland type and extent of the wetland boundaries, excluding Alternative W-1A. The field reviewed wetlands were then used as a baseline for photo interpretation to confirm wetland boundaries and types for wetland where access was more difficult due to terrain or heavy cover. For Alternative W-1A and inaccessible areas, topographic data from the Minnesota Geospatial Information Office (two foot contours) was used to estimate wetland boundaries.

Wetlands were also categorized into one of five plant communities as described by Eggers and Reed, including Shallow Marsh (SM), Wet Meadow (WM), Sedge Meadow (SME), Shrub-Carr (SC), and Seasonally Flooded Basin (SF).² Many of the identified wetlands have multiple plant communities. The different plant communities represented within the project area include:

- Shallow Marsh plant communities have soils that are saturated or inundated by standing water up to six inches in depth throughout most of the growing season. Herbaceous emergent vegetation such as cattails, bulrushes, arrowheads, and sedges characterize this community.
- Wet Meadow plant communities are dominated by grasses and by forbs such as giant goldenrod, growing on saturated soils. The forbs and grasses of these meadows tend to be less competitive, more nutrient demanding, and often shorter-lived species than the sedges of the sedge meadow community. Therefore, Wet Meadows may represent younger communities that indicate recent disturbances.
- Sedge Meadow plant communities are dominated by the sedges growing on saturated soils. Dominant vegetation includes sedges, spike-rushes, bulrushes, and nut-grasses. Grasses, especially Canada bluejoint grass, and true rushes may also be present. The forb species are diverse but scattered and may flower poorly under intense competition with the sedges.

² Plant Community descriptions can be found in the USACE's "Wetland Plants and Plant Communities of Minnesota and Wisconsin" (Eggers and Reed, 1997).

- Shrub-Carr communities are plant communities composed of tall, deciduous shrubs growing on saturated to seasonally flooded soils. They are usually dominated by willows and dogwoods. The ground layer typically includes some of the ferns, sedges, grasses, and forbs of sedge meadow and wet meadow communities.
- Seasonally Flooded Basins are poorly drained, shallow depressions that may have standing water for a few weeks each year but are usually dry for much of the growing season. These basins may be kettles in glacial deposits, low spots in outwash plains, or depressions in floodplains. Typical species include smartweeds, beggarticks, grasses, and nut-grasses. One unique aspect of seasonally flooded basins is that the alternating periods of flood and drought can eliminate perennial plants so that annual plant species typically dominate the community. These basins can have a forested component with a dominance of willow, ash, and other softwood trees.

Quality Assessment Method

Each wetland was also assigned a value rating of exceptional, high quality, medium quality, or low quality, based on a qualitative assessment of diversity and integrity of the plant community using the USACE's Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed, 1997).

These ratings include:

Exceptional: Plant community is undisturbed or sufficiently recovered from past disturbances such that it represents pre-European settlement conditions. Non-native plant species are absent or, if present, constitute a minor percent cover of that community. Unique features such as an old growth forest, never-plowed wet prairie, or threatened and endangered species may also be present.

High Quality: The plant community has a high diversity of native species with non-native and/or invasive species comprising less than 20 percent cover.

Medium Quality: The plant community has less diversity than the high quality, but the non-native/invasive species make up 20-50 percent of the total cover.

Low Quality: The plant community is comprised of only a few dominant species with more than 50 percent of the dominant species being non-native or invasive species.

Many of the areas identified as wetland have been disturbed or created as a result of prior grading/mining activities in the area. Over time, areas that are not provided positive drainage (ruts, old road/railroad beds, depressions) and have dense clayey soils hold water long enough to support wetland vegetation. At this time, jurisdiction of the wetland areas has not been determined; rather, it has been assumed that all identified wetland areas would be regulated if impacted. Any areas that were considered to be natural/undisturbed wetlands are noted in Table 1, based on 1948-1989 aerial photos (Figure 2 and Appendix B) and field observation of past disturbance (overburden, tailings).

Impact Analysis Methods

Water resources were evaluated for potential impacts based on a worst case assumption that everything within the construction limits would be impacted by the project. This approach allows for potential worst case impacts to be evaluated and expect that the impacts may be reduced as the project layout is refined.

Affected Environment

Inventory Results

Waterbodies: The only named surface water in the area of the Build Alternatives is the waterbody that has developed in the combined Mesabi Mountain Mine and Rouchleau Pits. Due to the rising water levels within the pit since mining ceased, the Mesabi Mountain Mine Pit (north end) and Rouchleau Pit (south end) are connected, creating one large waterbody (see Appendix B). For purposes of this report, herein this waterbody will be referred to as the Rouchleau Pit.

The Rouchleau Pit does not have any public access and is not identified on the DNR's Public Waters Inventory. It is estimated to be near 200 feet deep in the Mesabi Mountain Pit section and over 300 feet deep in the southern Rouchleau Pit section. According to City records, in the 1980s the water elevation in the Mesabi Mountain Mine pit was as low as 1,115 feet, and the 2009 peak water elevation was 1,310 feet (see the Water Supply Section of Draft EIS for more information regarding water levels). A MnDOT bathymetric survey conducted in 2013 indicates that the Rouchleau Pit water depth varies between five and over 300 feet.

The overall pit depth is estimated to be over 400 feet deep in some areas with banks above the water line that exceed 130 feet on the west side and nearly 170 feet on the east side near the proposed Alternative E-2 crossing (based on contours provided by MnDOT in June 2012).

This is a man-made waterbody that is groundwater fed. This waterbody does not meet the criteria for being a wetland due to its depth being greater than 6.6 feet deep.

Streams: There are four DNR Public Waters Inventory streams located with the project study area. These streams are identified on Figure 2 and are located along the W-1A alignment.

Wetlands: The wetlands identified for the Build Alternatives are listed in Table 1 and illustrated in Figure 1. The wetlands along Alternative W-1A are listed in Table 2 and shown in Figure 2.

Table 1: Inventoried wetlands within the Build Alternatives study area

WETLAND ID NUMBER	PLANT COMMUNITY	QUALITY	BASIN SIZE (ACRES)	FIELD REVIEWED
1	Shallow Marsh (Type 3)	Low	0.3	Yes
2	Wet Meadow/Shrub-Carr (Type 2/6)	Medium	14.4	Yes
3	Seasonally Flooded Basin (Type 1)	Low	0.4	Yes
4	Seasonally Flooded Basin (Type 1)	Low	0.5	Yes
5	Seasonally Flooded Basin (Type 1)	Low	0.4	Yes
6	Shallow Marsh (Type 3)	Low	0.1	Yes
7	Wet Meadow/Shrub-Carr (Type 2/6)	Medium	1.3	Yes
8	Wet Meadow/Shrub-Carr (Type 2/6)	Medium	1.1	Yes
9	Wet Meadow (Type 2)	Medium	0.2	Yes

WETLAND ID NUMBER	PLANT COMMUNITY	QUALITY	BASIN SIZE (ACRES)	FIELD REVIEWED
10	Wet Meadow/Shrub-Carr (Type 2/6)	Medium	3.7	Yes
11	Wet Meadow (Type 2)	Low	3.7	Yes
12	Wet Meadow/Shallow Marsh (Type 2/3)	Low	1.0	Yes
13	Wet Meadow/Shrub-Carr/Seasonally Flooded Basin (Type 2/6/1)	Medium	5.2	Yes
14	Wet Meadow (Type 2)	Low	0.3	Yes
15	Wet Meadow (Type 2)	Low	0.6	Yes
16	Wet Meadow/Shrub-Carr (Type 2/6)	Medium	6.4	Yes
17	Shallow Marsh/Wet Meadow (Type 3/2)	Low	1.1	Yes
18	Wet Meadow (Type 2)	Low	2.5	Yes
19	Shallow Marsh/Sedge Meadow (Type 3/2)	Medium	3.5	No
20	Shallow Marsh/Sedge Meadow (Type 3/2)	Medium	11.3	Yes
21	Wet Meadow (Type 2)	Low	0.0	Yes
22	Shallow Marsh (Type 3)	Medium	0.7	Yes
23	Sedge Meadow/Shrub-Carr (Type 2/6)	Medium	0.7	Yes
24	Shallow Marsh/Sedge Meadow (Type 3/2)	Medium	3.4	Yes
25	Wet Meadow (Type 2)	Low	0.4	Yes
26	Wet Meadow (Type 2)	Low	0.9	Yes
27	Shallow Marsh/Sedge Meadow (Type 3/2)	Medium	6.2	Yes
28	Wet Meadow (Type 2)	Low	0.0	Yes
29	Sedge Meadow (Type 2)	Low	0.4	Yes
30	Seasonally Flooded Basin (Type 1)	Low	0.2	Yes
31	Shallow Marsh (Type 3)	Low	0.3	Yes
32	Shallow Marsh/Sedge Meadow (Type 3/2)	Medium	11.8	Yes
33	Wet Meadow (Type 2)	Low	0.9	Yes
34	Sedge Meadow/Shrub-Carr (Type 2/6)	Medium	0.3	Yes
35	Sedge Meadow/Shrub-Carr (Type 2/6)	Medium	0.2	Yes
36 ¹	Sedge Meadow/Shrub-Carr (Type 2/6)	Medium	15.5	No
37	Open Water	Low	1.2	Yes
38	Shallow Marsh/Sedge Meadow/Shrub-Carr (Type 3/2/6)	Medium	1.5	No
39	Seasonally Flooded Basin (Type 1)	Low	0.1	Yes
40	Sedge Meadow/Shrub-Carr (Type 2/6)	Medium	1.9	Yes
41	Sedge Meadow (Type 2)	Medium	0.0	Yes
42	Shallow Marsh (Type 3)	Low	0.0	Yes
43	Wet Meadow (Type 2)	Low	0.2	Yes
44	Wet Meadow (Type 2)	Low	0.3	Yes
45	Shrub-Carr/Wet Meadow (Type 6/2)	Low	0.2	Yes
46	Wet Meadow (Type 2)	Low	1.3	Yes

WETLAND ID NUMBER	PLANT COMMUNITY	QUALITY	BASIN SIZE (ACRES)	FIELD REVIEWED
125	Sedge Meadow (Type 2)	<i>Medium</i>	15.07	No
126	Wet Meadow (Type 2)	<i>Low</i>	1.15	No
127	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Low</i>	10.90	No
128	Sedge Meadow/Shallow Marsh (Type 2/3)	<i>Low</i>	22.84	No

¹ Wetland #36 is a complex of small upland and wetland areas. The ratio of wetland to upland that makes up this complex is approximately 50:50. Due to the mixed nature of this area, the entire area was identified as wetland as a conservative estimate and would be further refined as the design concepts are refined.

Note: *Italicized* quality ratings are based on aerial photography (invasive species signature on aerial), prior disturbance, and adjacent land uses (Wetlands 47-128).

Table 2: Inventoried Wetlands for Alternative W-1A

WETLAND ID NUMBER	PLANT COMMUNITY	QUALITY	BASIN SIZE (ACRES)	FIELD REVIEWED
47	Shrub-Carr (Type 6)	<i>Medium</i>	41.46	No
48	Shrub-Carr/Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	14.31	No
49	Shallow Marsh (Type 3)	<i>Low</i>	0.53	No
50	Wet Meadow (Type 2)	<i>Low</i>	0.53	No
51	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	62.00	No
52	Sedge Meadow (Type 2)	<i>Medium</i>	6.42	No
53	Shrub-Carr/Seasonally Flooded Basin/Shallow Marsh (Type 6/1/2)	<i>Medium</i>	76.30	No
54	Seasonally Flooded Basin/Sedge Meadow (Type 1/2)	<i>Medium</i>	5.25	No
55	Wet Meadow (Type 2)	<i>Low</i>	4.47	No
56	Wet Meadow (Type 2)	<i>Low</i>	6.28	No
57	Wet Meadow/Shallow Marsh (Type 2/3)	<i>Medium</i>	30.74	No
58	Shallow Marsh/Sedge Meadow (Type 2/3)	<i>Medium</i>	26.07	No
59	Shrub-Carr/ Wet Meadow (Type 6/2)	<i>Medium</i>	12.59	No
60	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	17.68	No
61	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	31.23	No
62	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	52.11	No
63	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	74.46	No
64	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	5.70	No
65	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	138.19	No
66	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	10.92	No
67	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	21.32	No
68	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	46.78	No

WETLAND ID NUMBER	PLANT COMMUNITY	QUALITY	BASIN SIZE (ACRES)	FIELD REVIEWED
69	Sedge Meadow (Type 2)	Medium	14.10	No
70	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	Medium	32.72	No
71	SME/SM/SC	Medium	33.01	No
72	Wet Meadow (Type 2)	Low	3.88	No
73	Shrub-Carr/Sedge Meadow (Type 6/2)	Medium	46.58	No
74	Wet Meadow (Type 2)	Low	9.62	No
75	Wet Meadow (Type 2)	Low	24.09	No
76	Wet Meadow (Type 2)	Low	1.15	No
77	Seasonally Flooded Basin/Sedge Meadow (Type 1/2)	Medium	32.39	No
78	Shallow Marsh/Wet Meadow (Type 2/3)	Low	5.75	No
79	Shallow Marsh (Type 3)	Medium	12.26	No
80	Seasonally Flooded Basin/Sedge Meadow (Type 1/2)	Medium	81.79	No
81	Sedge Meadow (Type 2)	Medium	6.36	No
82	Sedge Meadow (Type 2)	Medium	34.13	No
83	Sedge Meadow (Type 2)	Medium	1.13	No
84	Wet Meadow (Type 2)	Low	1.21	No
85	Seasonally Flooded Basin/Sedge Meadow (Type 1/ 2)	Medium	26.07	No
86	Shallow Marsh (Type 3)	Low	0.35	No
87	Seasonally Flooded Basin (Type 1)	Medium	4.30	No
88	Shrub-Carr/Sedge Meadow (Type 6/2)	Medium	7.83	No
89	Wet Meadow/Shallow Marsh (Type 2/3)	Low	36.22	No
90	Wet Meadow/Shallow Marsh (Type 2/3)	Low	26.90	No
91	Wet Meadow (Type 2)	Low	0.91	No
92	Sedge Meadow (Type 2)	Low	1.38	No
93	Wet Meadow (Type 2)	Low	0.09	No
94	Wet Meadow (Type 2)	Low	0.50	No
95	Shrub-Carr/Sedge Meadow (Type 6/2)	Medium	4.75	No
96	Shrub-Carr/Sedge Meadow (Type 6/2)	Medium	3.39	No
97	Sedge Meadow (Type 2)	Low	1.20	No
98	Wet Meadow (Type 2)	Low	5.15	No
99	Wet Meadow (Type 2)	Low	4.94	No
100	Wet Meadow/Shrub-Carr (Type 2/6)	Medium	0.77	No
101	Shrub-Carr/Sedge Meadow (Type 6/2)	Medium	20.00	No
102	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin/Shallow Marsh (Type 6/2/1/3)	Medium	99.22	No
103	Seasonally Flooded Basin/ Sedge Meadow (Type 1/2)	Medium	23.09	No
104	Shrub-Carr/Sedge Meadow (Type 6/2)	Medium	11.48	No

WETLAND ID NUMBER	PLANT COMMUNITY	QUALITY	BASIN SIZE (ACRES)	FIELD REVIEWED
105	Wet Meadow/Shrub-Carr (Type 2/6)	<i>Medium</i>	6.80	No
106	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	144.88	No
107	Wet Meadow, Shallow Marsh, Shrub-Carr/Seasonally Flooded Basin (Type 2/3/6/1)	<i>High</i>	140.67	No
108	Wet Meadow (Type 2)	<i>Low</i>	4.61	No
109	Shallow Marsh (Type 3)	<i>Low</i>	2.01	No
110	Wet Meadow (Type 2)	<i>Low</i>	20.21	No
111	Wet Meadow/Shallow Marsh (Type 2/3)	<i>Low</i>	4.20	No
112	Sedge Meadow/Seasonally Flooded Basin (Type 2/1)	<i>Low</i>	9.39	No
113	Sedge Meadow/Seasonally Flooded Basin (Type 2/1)	<i>Medium</i>	30.52	No
114	Sedge Meadow/Seasonally Flooded Basin (Type 2/1)	<i>Low</i>	15.19	No
115	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	31.40	No
116	Wet Meadow (Type 2)	<i>Low</i>	4.29	No
117	Wet Meadow/Shrub-Carr (Type 2/6)	<i>Medium</i>	24.73	No
118	Wet Meadow (Type 2)	<i>Low</i>	1.73	No
119	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	1.68	No
120	Wet Meadow (Type 2)	<i>Low</i>	0.26	No
121	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	2.34	No
122	Shallow Marsh/Wet Meadow (Type 3/2)	<i>Low</i>	1.52	No
123	Wet Meadow/Seasonally Flooded Basin (Type 2/1)	<i>Medium</i>	17.62	No
124	Wet Meadow (Type 2)	<i>Low</i>	0.80	No

Note: *Italicized* quality ratings are based on aerial photography (invasive species signature on aerial), prior disturbance, and adjacent land uses (Wetlands 47-128).

Environmental Consequences

Direct Impacts

No Build Alternative

The No Build Alternative would not impact any wetlands, streams, nor have direct impacts to the Rouchleau Pit.

Existing US 53 Alternative

The Existing US 53 Alternative would not impact any wetlands, streams, nor have direct impacts to the Rouchleau Pit.

Alternative M-1

Seven wetlands were identified within the M-1 construction limits with a total wetland impact of up to 8.8 acres. The impacts by individual wetland are listed in Table 3 and shown in Figure 1.

This alternative would have no direct impacts to the Rouchleau Pit or area streams.

Table 3: Wetland Impacts of Alternative M-1

WETLAND ID NUMBER	PLANT COMMUNITY	RELATIVE WETLAND QUALITY	ESTIMATED FILL IMPACTS (ACRES)
2	Wet Meadow/Shrub-Carr (Type 2/6)	Medium	6.9
3	Seasonally Flooded Basin (Type 1)	Low	0.4
4	Seasonally Flooded Basin (Type 1)	Low	0.1
5	Seasonally Flooded Basin (Type 1)	Low	0.04
10	Wet Meadow/Shrub-Carr (Type 2/6)	Medium	0.08
13	Wet Meadow/Shrub-Carr/Floodplain Forest (Type 2/6/1)	Medium	1.08
46	Wet Meadow (Type 2)	Low	0.2
TOTAL:			8.8

Alternative E-1A

This alternative would have the potential to impact 16 wetlands with up to a total of 6.7 acres of impact. The impacts by individual wetland are listed in Table 4 and shown in Figure 1. This alternative crosses through the shallowest part of the Rouchleau Pit along an existing submerged haul road embankment and may require a temporary drawdown of up to 30 feet during construction. The crossing through the Rouchleau Pit was assumed to be on fill, affecting approximately 20 acres of the pit.

Table 4: Wetland Impacts of Alternative E-1A

WETLAND ID NUMBER	PLANT COMMUNITY	RELATIVE WETLAND QUALITY	ESTIMATED FILL IMPACTS (ACRES)
11	Wet Meadow (Type 2)	Low	0.1
13	Wet Meadow/Shallow Marsh (Type 2/3)	Medium	0.8
15	Wet Meadow/Shrub-Carr/Seasonally Flooded Basin (Type 2/6/1)	Low	0.0
16	Wet Meadow (Type 2)	Medium	0.1
23	Wet Meadow (Type 2)	Medium	0.7
24	Wet Meadow/Shrub-Carr (Type 2/6)	Medium	0.2
26	Shallow Marsh/Wet Meadow (Type 3/2)	Low	0.1
27	Wet Meadow (Type 2)	Medium	0.2
28	Shallow Marsh/Sedge Meadow (Type 3/2)	Low	0.0
29	Shallow Marsh/Sedge Meadow (Type 3/2)	Low	0.2
30	Wet Meadow (Type 2)	Low	0.2
31	Shallow Marsh (Type 3)	Low	0.3
32	Sedge Meadow/Shrub-Carr (Type 2/6)	Medium	2.3
40	Shallow Marsh/Sedge Meadow (Type 3/2)	Medium	1.5
41	Wet Meadow (Type 2)	Medium	0.0
42	Wet Meadow (Type 2)	Low	0.0
TOTAL:			6.7

Alternative E-2

This alternative would have the potential to impact 13 wetlands with up to a total of 4.9 acres of impact. The impacts by individual wetland are listed in Table 5 and shown in Figure 1.

The Rouchleau Pit may be impacted with bridge piers for a bridge crossing over the pit.

Table 5: Wetland Impacts of Alternative E-2

WETLAND ID NUMBER	PLANT COMMUNITY	RELATIVE WETLAND QUALITY	ESTIMATED FILL IMPACTS
13	Wet Meadow/Shrub-Carr/Seasonally Flooded Basin (Type 2/6/1)	Medium	1.4
22	Shallow Marsh (Type 3)	Medium	0.08
23	Sedge Meadow/Shrub-Carr (Type 2/6)	Medium	0.03
24	Shallow Marsh/Sedge Meadow (Type 3/2)	Medium	1.87
25	Wet Meadow (Type 2)	Low	0.09
26	Wet Meadow (Type 2)	Low	0.75
28	Wet Meadow (Type 2)	Low	0.01
29	Sedge Meadow (Type 2)	Low	0.01
30	Seasonally Flooded Basin (Type 1)	Low	0.07
31	Shallow Marsh (Type 3)	Low	0.05
32	Shallow Marsh/Sedge Meadow (Type 3/2)	Medium	0.28
43	Wet Meadow (Type 2)	Low	0.18
44	Wet Meadow (Type 2)	Low	0.08
TOTAL:			4.9

Alternative W-1A (not to be studied in Draft EIS)

The acquisition of new right-of-way would have the potential to impact wetlands on either side of the existing roads (Co. 7 and MN 37). A total of 61 wetlands were identified within the 200-foot estimated construction limits with a total impact of up to 95.5 acres. Impacts to individual wetlands are listed in Table 6 and shown in Figure 2. This alternative would cross four DNR Public Waterways as shown in Figure 2.

This alternative would have no direct impacts to the Rouchleau Pit.

Table 6: Wetland Impacts of Alternative W-1A

ID NUMBER	PLANT COMMUNITY	RELATIVE WETLAND QUALITY	ESTIMATED FILL IMPACTS (ACRES)
47	Shrub-Carr (Type 6)	<i>Medium</i>	0.25
48	Shrub-Carr/Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	0.92
49	Shallow Marsh (Type 3)	<i>Low</i>	0.13
53	Shrub-Carr/Seasonally Flooded Basin/Shallow Marsh (Type 6/1/2)	<i>Medium</i>	0.92
54	Seasonally Flooded Basin/Sedge Meadow (Type 1/2)	<i>Medium</i>	0.07
55	Wet Meadow (Type 2)	<i>Low</i>	0.38
56	Wet Meadow (Type 2)	<i>Low</i>	1.24
58	Shallow Marsh/Sedge Meadow (Type 2/3)	<i>Medium</i>	4.19
60	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	0.91
61	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	2.50
62	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	6.07
63	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	1.35
64	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	1.62
65	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	0.51
66	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	1.86
67	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	4.40
68	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	1.23
70	Shrub-Carr/ Seasonally Flooded Basin (Type 6/1)	<i>Medium</i>	6.23
71	SME/SM/SC	<i>Medium</i>	0.11
73	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	0.80
74	Wet Meadow (Type 2)	<i>Low</i>	1.38
75	Wet Meadow (Type 2)	<i>Low</i>	0.05
76	Wet Meadow (Type 2)	<i>Low</i>	0.26
77	Seasonally Flooded Basin/Sedge Meadow (Type 1/2)	<i>Medium</i>	2.06
78	Shallow Marsh/Wet Meadow (Type 2/3)	<i>Low</i>	0.66

ID NUMBER	PLANT COMMUNITY	RELATIVE WETLAND QUALITY	ESTIMATED FILL IMPACTS (ACRES)
80	Seasonally Flooded Basin/Sedge Meadow (Type 1/2)	<i>Medium</i>	5.88
81	Sedge Meadow (Type 2)	<i>Medium</i>	0.90
82	Sedge Meadow (Type 2)	<i>Medium</i>	0.43
84	Wet Meadow (Type 2)	<i>Low</i>	0.13
87	Seasonally Flooded Basin (Type 1)	<i>Medium</i>	0.61
88	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	0.68
89	Wet Meadow/Shallow Marsh (Type 2/3)	<i>Low</i>	2.79
90	Wet Meadow/Shallow Marsh (Type 2/3)	<i>Low</i>	0.26
91	Wet Meadow (Type 2)	<i>Low</i>	0.33
92	Sedge Meadow (Type 2)	<i>Low</i>	0.51
93	Wet Meadow (Type 2)	<i>Low</i>	0.09
94	Wet Meadow (Type 2)	<i>Low</i>	0.23
95	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	0.05
96	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	1.57
97	Sedge Meadow (Type 2)	<i>Low</i>	0.02
98	Wet Meadow (Type 2)	<i>Low</i>	1.56
99	Wet Meadow (Type 2)	<i>Low</i>	3.11
100	Wet Meadow/Shrub-Carr (Type 2/6)	<i>Medium</i>	0.29
101	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	5.55
102	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin/Shallow Marsh (Type 6/2/1/3)	<i>Medium</i>	5.46
103	Seasonally Flooded Basin/Sedge Meadow (Type 1/2)	<i>Medium</i>	2.04
104	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	3.13
105	Wet Meadow/Shrub-Carr (Type 2/6)	<i>Medium</i>	0.87
106	Shrub-Carr/Sedge Meadow/Seasonally Flooded Basin (Type 6/2/1)	<i>Medium</i>	2.67
107	Wet Meadow, Shallow Marsh, Shrub-Carr/Seasonally Flooded Basin (Type 2/3/6/1)	<i>High</i>	4.35
108	Wet Meadow (Type 2)	<i>Low</i>	1.21
110	Wet Meadow (Type 2)	<i>Low</i>	0.26

ID NUMBER	PLANT COMMUNITY	RELATIVE WETLAND QUALITY	ESTIMATED FILL IMPACTS (ACRES)
113	Sedge Meadow/Seasonally Flooded Basin (Type 2/1)	<i>Medium</i>	2.94
114	Sedge Meadow/Seasonally Flooded Basin (Type 2/1)	<i>Low</i>	0.63
116	Wet Meadow (Type 2)	<i>Low</i>	2.53

ID NUMBER	PLANT COMMUNITY	RELATIVE WETLAND QUALITY	ESTIMATED FILL IMPACTS (ACRES)
119	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	0.13
121	Shrub-Carr/Sedge Meadow (Type 6/2)	<i>Medium</i>	0.07
122	Shallow Marsh/Wet Meadow	<i>Low</i>	0.56
123	Wet Meadow/Seasonally Flooded Basin (Type 2/1)	<i>Medium</i>	4.28
TOTAL:			95.50

Note: *Italicized* quality ratings are based on aerial photography (invasive species signature on aerial), prior disturbance, and adjacent land uses (Wetlands 47-128).

Construction Phase (Temporary) Impacts

Construction phase impacts to wetlands would result from the Build Alternatives for the US 53 project. Temporary impacts may result from equipment access required to build the roadway and structures. The extent of temporary impacts cannot be estimated at this time; however, it is expected that grading and soil disturbance during construction would be mitigated through implementation of best management practices for erosion control.

Avoidance, Minimization, and Mitigation Measures

Permits and Approval Requirements

Wetland permits from the USACE (Section 404) and MPCA (Section 401 certification) will be required as part of this project. An Individual Permit is typically required for road projects with over five acres of wetland impact. Additionally, MnDOT, as the designated LGU, will issue a WCA wetland replacement plan approval for this project. All of these permits and approvals require wetland sequencing (avoidance, minimization and mitigation) to be addressed.

Avoidance and Minimization

Measures to avoid wetland impacts will be considered as the preferred alternative is selected and as the preliminary design layout is developed. However, it is not possible to avoid all wetland areas given their size and locations and other constraints required to design the new road alignments; therefore, some level of wetland impact will be unavoidable.

Measures to minimize wetland impacts will be considered as the preferred alternative is selected and as the preliminary and final design layout is developed. Wetland impacts will be minimized by narrowing the construction limits and possibly shifting the preferred alternative alignment slightly to avoid wetlands to the extent possible.

At this time, it is not possible to determine a specific impact reduction estimate for the Build Alternatives; however, it can be estimated that the impacts may be reduced through typical avoidance and minimization measures described.

Mitigation

As described in the previous section, measures to avoid wetland impacts would be considered as the conceptual layout is developed. However, it is not possible to avoid all wetland areas given the size and location of wetland areas and other constraints required to design the new road alignments; therefore, some level of wetland mitigation would be required.

The current minimum wetland replacement ratio for wetland credits is 1:1 for WCA regulated impacts and 1:1 for USACE regulated impacts on MnDOT road projects in the northeast part of the state if replacement is in the same Bank Service Area (BSA) as the impact. Because the potential for wetland restoration is limited in the northeast, options for wetland replacement include wetland creation or wetland bank credits. Creating on-site or project-specific mitigation for the project's wetland impacts may be considered after a preferred alternative has been selected. Areas where wetland creation would be considered include areas where existing four-lane roadway would be converted to two-lane and excess existing right-of-way is present. Due to the previously disturbed nature of the project area, cost, mineral rights, and project timing, on-site mitigation may not be the most efficient or preferred method for replacement by the permitting agencies.

MnDOT has access to (i.e., has purchased) established wetland credits in the BWSR Road Bank; however, there are virtually no USACE approved wetland credits in the impact BSA as of Fall 2013. The BWSR Road Bank does contain several hundred USACE-approved wetland credits in two adjacent BSAs (BSA 5 and BSA 6). At the time of permitting, it is MnDOT's intent to use the closest appropriate USACE-approved wetland credits in the BWSR Road Bank.

With regard to the Rouchleau Pit, best management practices for sediment and erosion control would be used to minimize impacts to water quality (addressed in Water Supply and Water Quality sections of the Draft EIS).

Summary of Wetland Impacts by Alternative

Table 7: Summary of Potential Impacts and Mitigation Required by Alternative

ALTERNATIVE	POTENTIAL DIRECT IMPACTS (WORST CASE)	MINIMUM WETLAND MITIGATION REQUIRED
No Build	0	0
Existing US 53	0	0
Alternative M-1	8.8 acres	8.8 acres
Alternative E-1A	6.7 acres	6.7 acres
Alternative E-2	4.9 acres	4.9 acres
Alternative W-1A	95.50 acres	95.50 acres

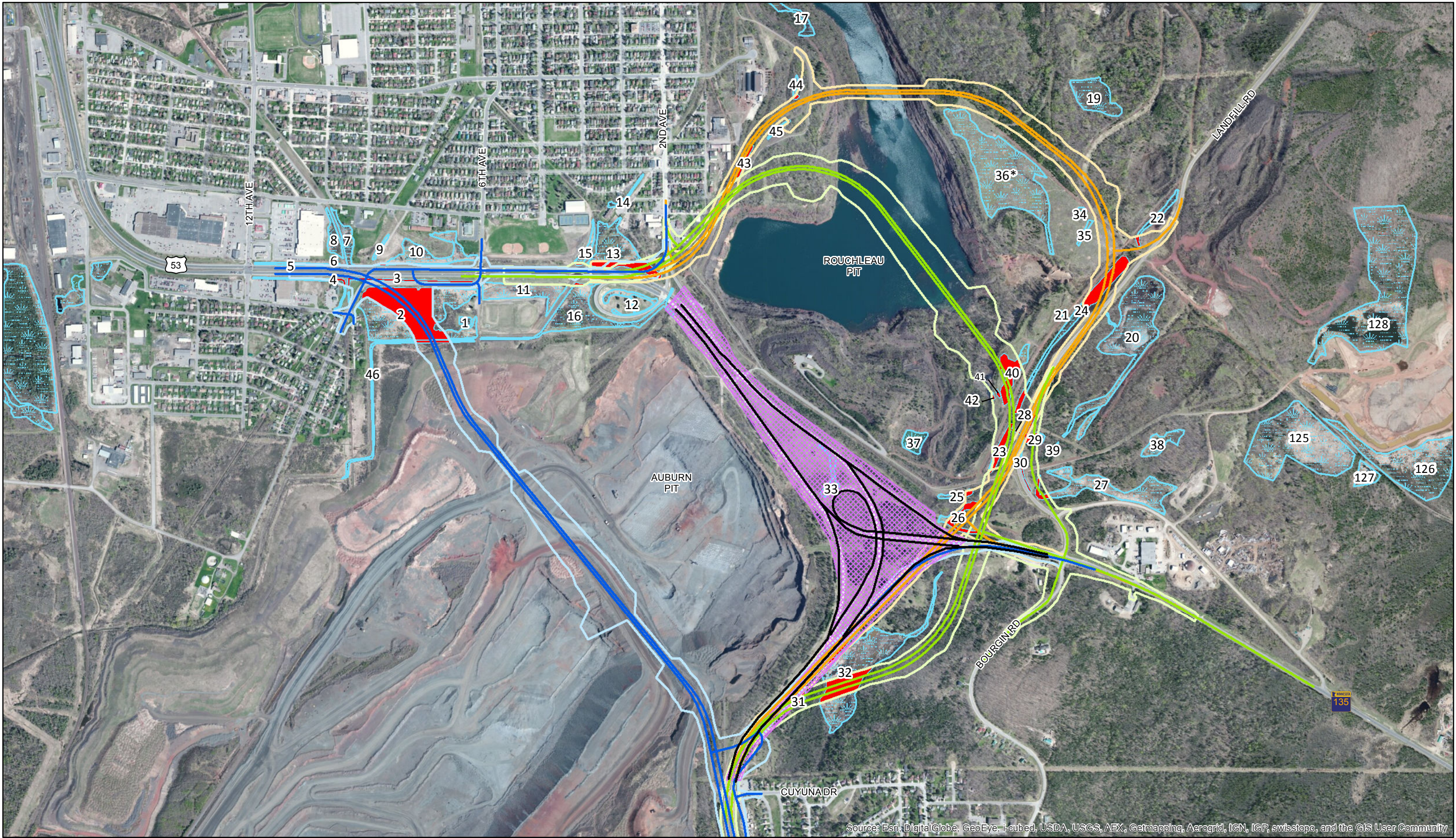
Coordination

The USACE was contacted regarding inventory and quality assessment methodologies. MnDOT Environmental Stewardship Office was contacted to obtain information regarding MnDOT Wetland Mitigation Banking credits available in the state of Minnesota.

Appendices

Appendix A – "Wetland Plants and Plant Communities of Minnesota and Wisconsin" (Eggers and Reed, 1997).

Appendix B – Aerial Photos Documenting Prior Disturbance



Source: Esri, DigitalGlobe, GeoEye, I-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Legend

- | | | |
|------------------------------|--|------------------------------|
| — Existing US 53 Alternative | Existing US 53 Easement Area | Estimated Wetland Boundaries |
| — Alternative M-1 | Alternative M-1 Estimated Construction Limits | Potential Wetland Impacts |
| — Alternative E-1A | Alternative E-1A Estimated Construction Limits | |
| — Alternative E-2 | Alternative E-2 Estimated Construction Limits | |

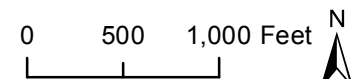
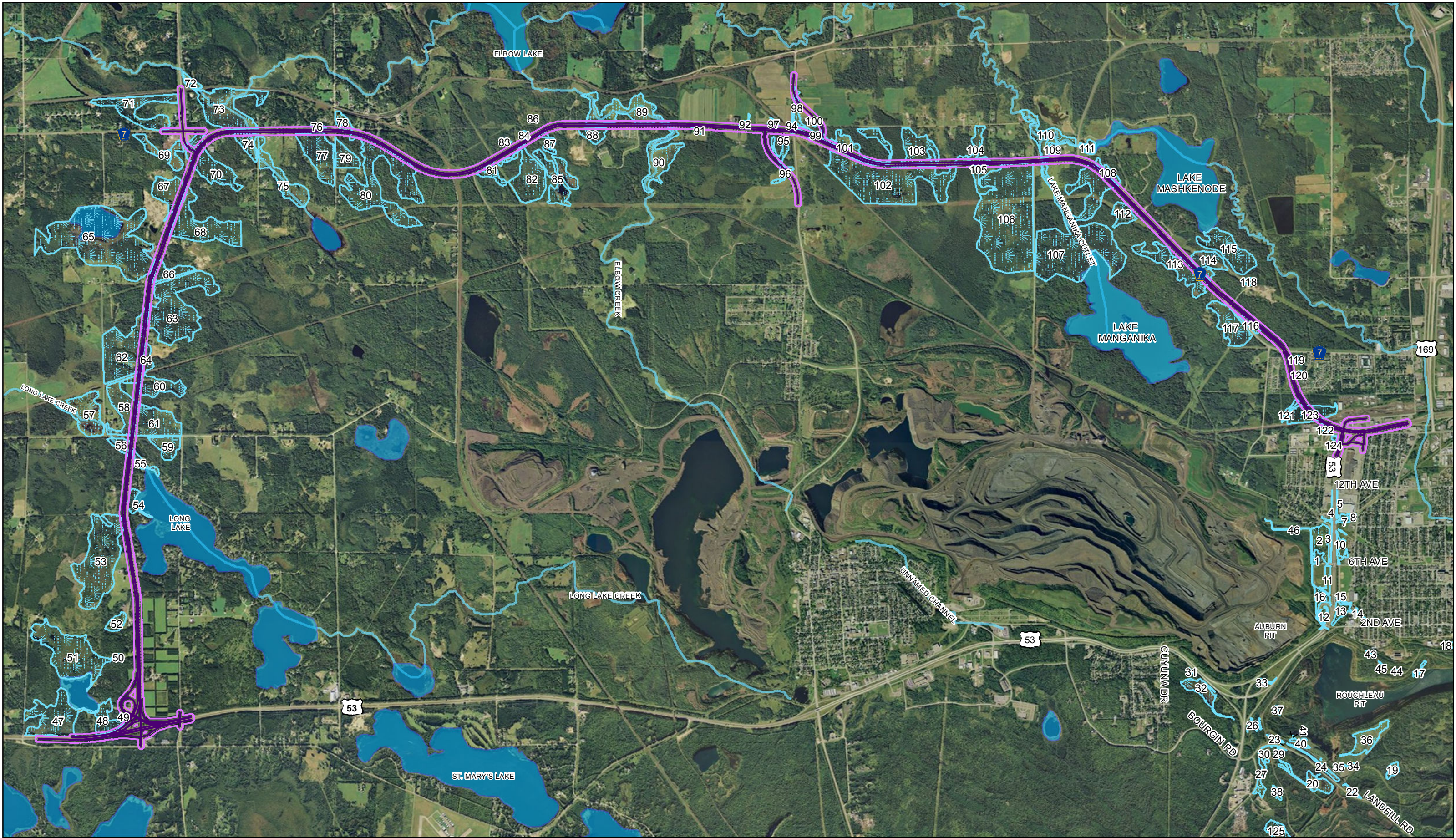


FIGURE 1
Water Resources

US Highway 53 Virginia to Eveleth
Draft Environmental Impact Statement



- Legend
- Alignment W-1A
 - W-1A Estimated Construction Limits
 - Estimated Wetland Boundaries

0 1,500 3,000 Feet



FIGURE 2
W-1A Water Resources
 US Highway 53 Virginia to Eveleth
 Draft Environmental Impact Statement

Appendix A

Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed, 1997)

SECTION 2

KEY TO THE WETLAND
PLANT COMMUNITIES

KEY TO THE WETLAND PLANT COMMUNITIES

- 1A. Mature trees (dbh >6 inches) are present and form closed stands (>17 trees/acre; >50 percent canopy cover).....2
- 2A. Hardwood trees are dominant (>50 percent areal cover or basal area of the tree stratum); alluvial, peaty/mucky, or poorly-drained mineral soils.....3
- 3A. Floodplains that are temporarily inundated during flood events, but may be relatively well-drained for much of the growing season; silver maple, American elm, river birch, green ash, black willow, swamp white oak, box elder and/or plains cottonwood are dominant;**FLOODPLAIN FOREST**
- 3B. Ancient lake basins, closed depressions, or retired riverine oxbows, that have longer term inundation/saturation during the growing season.....4
- 4A. Black ash, green ash, yellow birch, red maple, quaking aspen, balsam poplar, silver maple, black willow and/or plains cottonwood are dominant; northern white cedar may be subdominant; growing on poorly-drained mineral or peat/muck soils often associated with ancient lake basins and retired riverine oxbows.....**HARDWOOD SWAMP**
- 4B. Quaking aspen, plains cottonwood, red maple, American elm, silver maple, yellow-bud hickory and/or green ash are dominant growing in seasonally ponded depressions.....**HARDWOOD SWAMP (Vernal Pool Subtype)**
- 2B. Coniferous trees are dominant (>50 percent areal cover or basal area of the tree stratum); soils usually mucky/peaty.....5
- 5A. Tamarack and/or black spruce are dominant; growing on a nearly continuous *Sphagnum* moss mat and acidic, peat soils.....**CONIFEROUS BOG**
- 5B. Northern white cedar and/or tamarack are dominant; nearly continuous *Sphagnum* moss mat absent; usually growing on neutral to alkaline peats or mucks.....**CONIFEROUS SWAMP**
- 1B. Mature trees are absent or, if present, form open, sparse stands; other woody plants, if present, are shrubs, saplings, or pole size trees (dbh <6 inches) less than 20 feet in height.....6
- 6A. Community dominated (>50 percent areal cover) by woody shrubs.....7
- 7A. Low, woody shrubs usually <3 feet in height; *Sphagnum* moss mat layer may or may not be present.....8
- 8A. Shrubs are ericaceous (Heath family) and evergreen growing on a *Sphagnum* moss mat; peat soils are acidic; common.....**OPEN BOG**
- 8B. Shrubs are deciduous, mostly shrubby cinquefoil, often growing on sloping sites with a spring-fed supply of internally flowing, calcareous waters; calcium-tolerant plants (calciphiles) are

KEY TO THE WETLAND PLANT COMMUNITIES

dominant; *Sphagnum* moss mat layer absent; muck or poorly-drained mineral soils are alkaline; rare...
.....**CALCAREOUS FEN**

7B. Tall, deciduous shrubs usually >3 feet in height; *Sphagnum* moss mat absent.....9

9A. Speckled alder is dominant; usually growing on acidic hydric soils in and north of the
vegetation tension zone.....**ALDER THICKET**

9B. Willows, red-osier dogwood, silky dogwood, meadowsweet and/or steplebush are
dominant; usually growing on neutral to alkaline hydric soils; found both north and south of the
vegetation tension zone; NOTE: Non-native buckthorns (*Rhamnus cathartica* and *Frangula alnus*)
can occur as dominant shrubs or small trees in disturbed sites**SHRUB-CARR**

6B. Community dominated (>50 percent areal cover) by herbaceous plants.....10

10A. Aquatic emergent and terrestrial vegetation layers absent; dominated by floating, floating-
leaved and/or submergent species; water depths up to 6.6 feet.....
.....**SHALLOW, OPEN WATER COMMUNITIES**

10B. Aquatic emergent and/or terrestrial vegetation layers present; standing water may or may
not be present.....11

11A. Permanently to seasonally inundated by water depths up to 3 feet or more during
most growing seasons; dominated by perennial aquatic emergent, floating, floating-leaved and/or
submergent vegetation layers¹.....12

12A. Inundated by water depths of 6 inches to 3 feet or more throughout the growing
season in most years; community a mixture of aquatic emergent, floating, floating-leaved and/or
submergent layers.....**DEEP MARSH**

12B. Inundated by water depths up to 6 inches, often drying down to saturated soils
during the latter half of most growing seasons; aquatic emergent layer is dominant; floating and
floating-leaved layers may be present but not dominant.....**SHALLOW MARSH**

11B. Temporarily inundated to saturated soils during most growing seasons; floating,
floating-leaved and submergent layers absent.....13

13A. Temporarily inundated for a few weeks in spring giving way to mudflats and
then dry for the remainder of the growing season; annuals (e.g., smartweeds, wild millet) typically
dominate by the late growing season; often cultivated for row crops; geomorphic position consists of
basins or flats.....**SEASONALLY FLOODED BASIN**

¹ Wild rice, an annual, can also be a dominant in marshes.

KEY TO THE WETLAND PLANT COMMUNITIES

- 13B. Saturated soils, at most briefly inundated; typically 75-100 percent areal cover by perennial vegetation; geomorphic position variable.....14
- 14A. Nearly continuous *Sphagnum* moss mat on acidic, peat soils; sedges and forbs tolerant of low nutrient conditions are characteristic.....**OPEN BOG**
- 14B. Nearly continuous *Sphagnum* moss mat absent or sparse; soils typically circumneutral to alkaline peats, mucks or hydric mineral soils.....15
- 15A. Spring-fed supply of internally flowing, calcareous groundwater; dominated by calcium-tolerant species (calciphiles) such as sterile sedge, Grass of Parnassus, and beaked spike-rush; typically on sloping or domed muck soils; rare.....**CALCAREOUS FEN**
- 15B. Calciphiles not dominant; water source/chemistry/soils not restricted to the above; both common and rare communities.....16
- 16A. Dominated by sedges, primarily *Carex*.....17
- 17A. A floating mat primarily composed of wiregrass sedge (*Carex lasiocarpa*) and/or bog sedge (*C. oligosperma*); common associates are other sedges, Canada blue-joint grass, marsh fern and various forbs.....**SEDGE MAT**
- 17B. Floating mat absent; well developed peat, muck or hydric mineral soils dominated by hummock sedge (*Carex stricta*) and/or other sedges².....**SEDGE MEADOW**
- 16B. Dominated by grasses and/or forbs18
- 18A. Dominated by native prairie grasses (e.g., prairie cord-grass, big bluestem, narrow reedgrass, switch grass) with native prairie forbs; growing on hydric mineral soils; predominately occurs south of the vegetation tension zone; rare...**WET to WET-MESIC PRAIRIE**
- 18B. Dominated by Canada blue-joint grass, non-native grasses (e.g., reed canary grass, redtop) and/or forbs not restricted to prairies; soils are peats, mucks or mineral; occurs in both floristic provinces and tension zone; common.....19
- 19A. Dominated by Canada blue-joint grass and/or native forbs**FRESH (WET) MEADOW (Native Subtype)**
- 19B. Dominated by non-native grasses and/or forbs indicative of disturbance (e.g., stinging nettle, giant ragweed).....**FRESH (WET) MEADOW (Disturbed Subtype)**

²Some sedges (e.g., *Carex lacustris*) can dominate shallow marshes. Use couplet 11 to differentiate sedge-dominated shallow marshes from sedge meadows.

KEY TO THE WETLAND PLANT COMMUNITIES

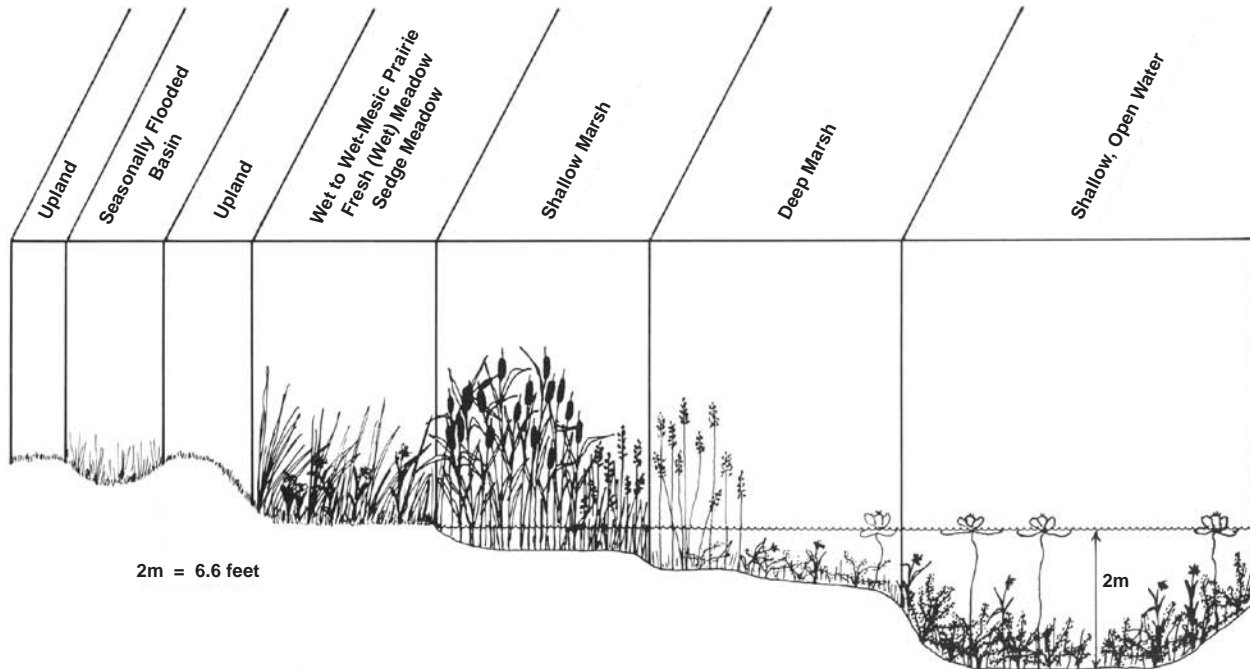


FIGURE 5 - **Generalized Cross Section of a Meadow-Marsh-Open Water Complex**

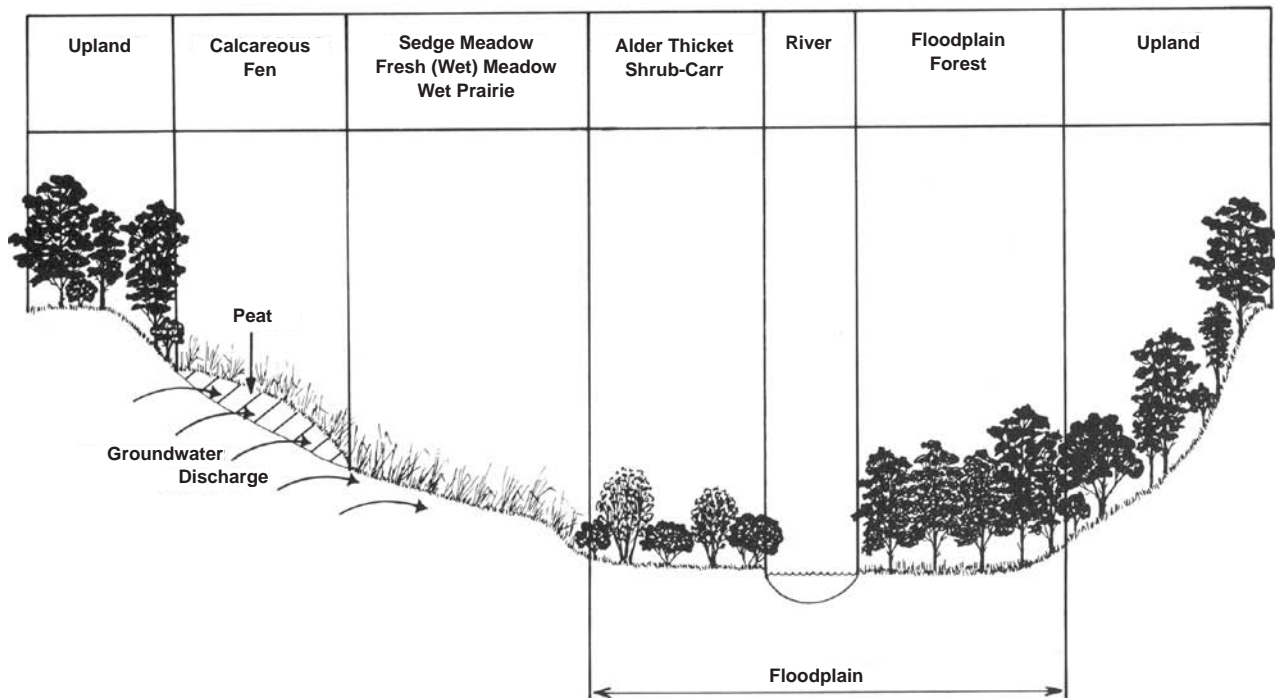


FIGURE 6 - **Generalized Cross Section of Wetland Plant Communities in a River Valley**

KEY TO THE WETLAND PLANT COMMUNITIES

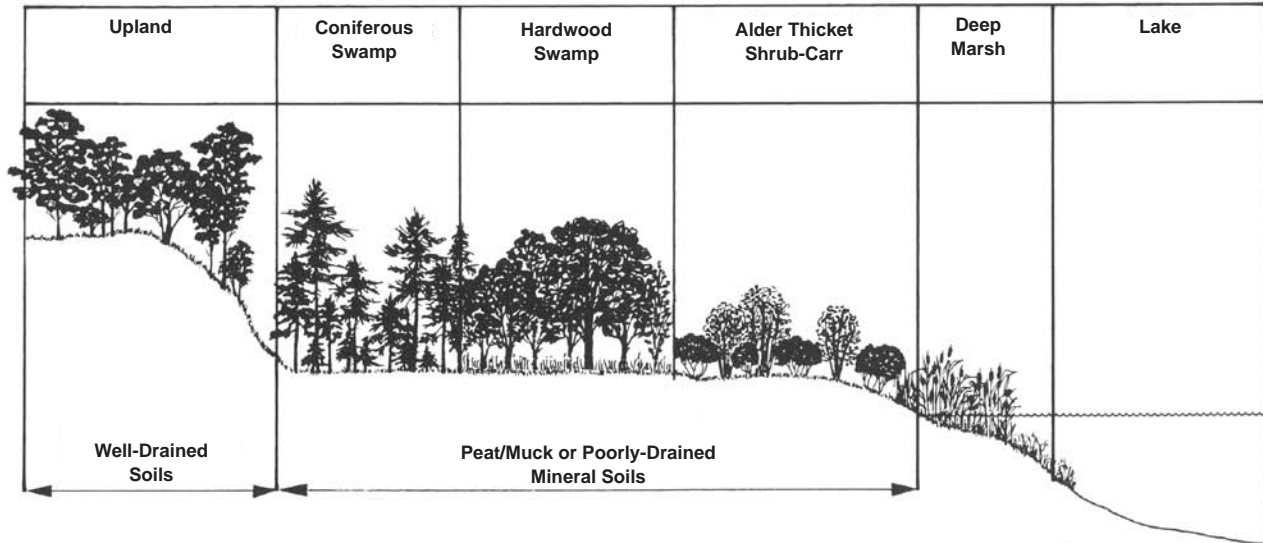


FIGURE 7 - Generalized Cross Section of Wetland Plant Communities in a Lake Basin

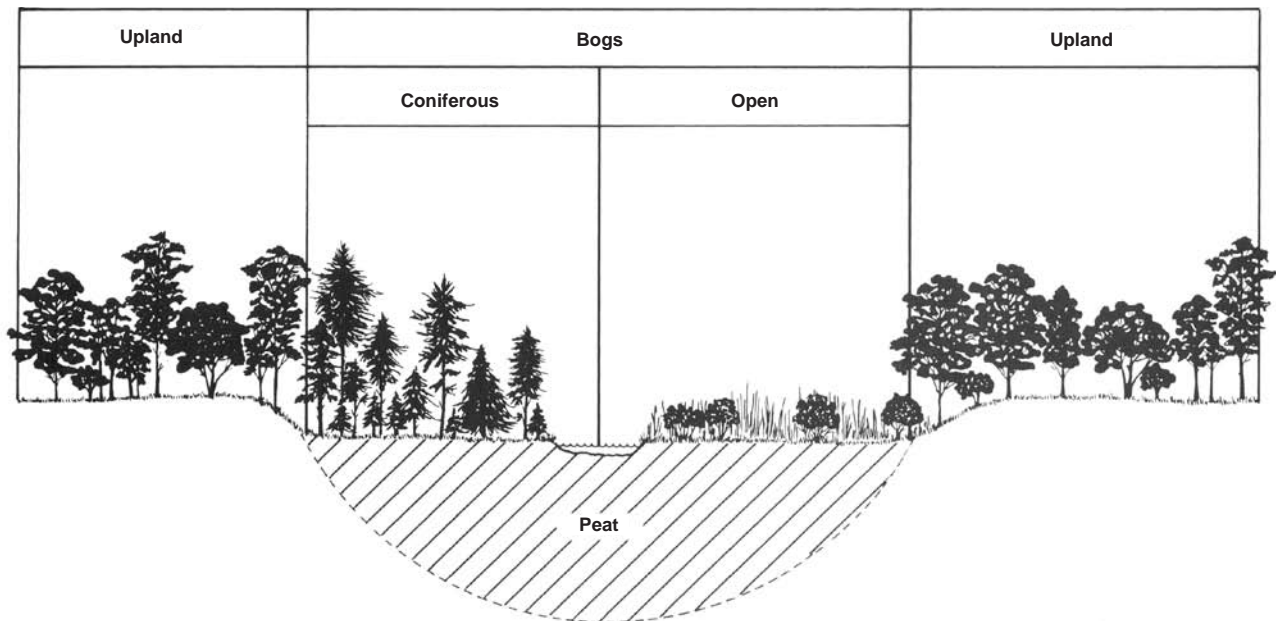
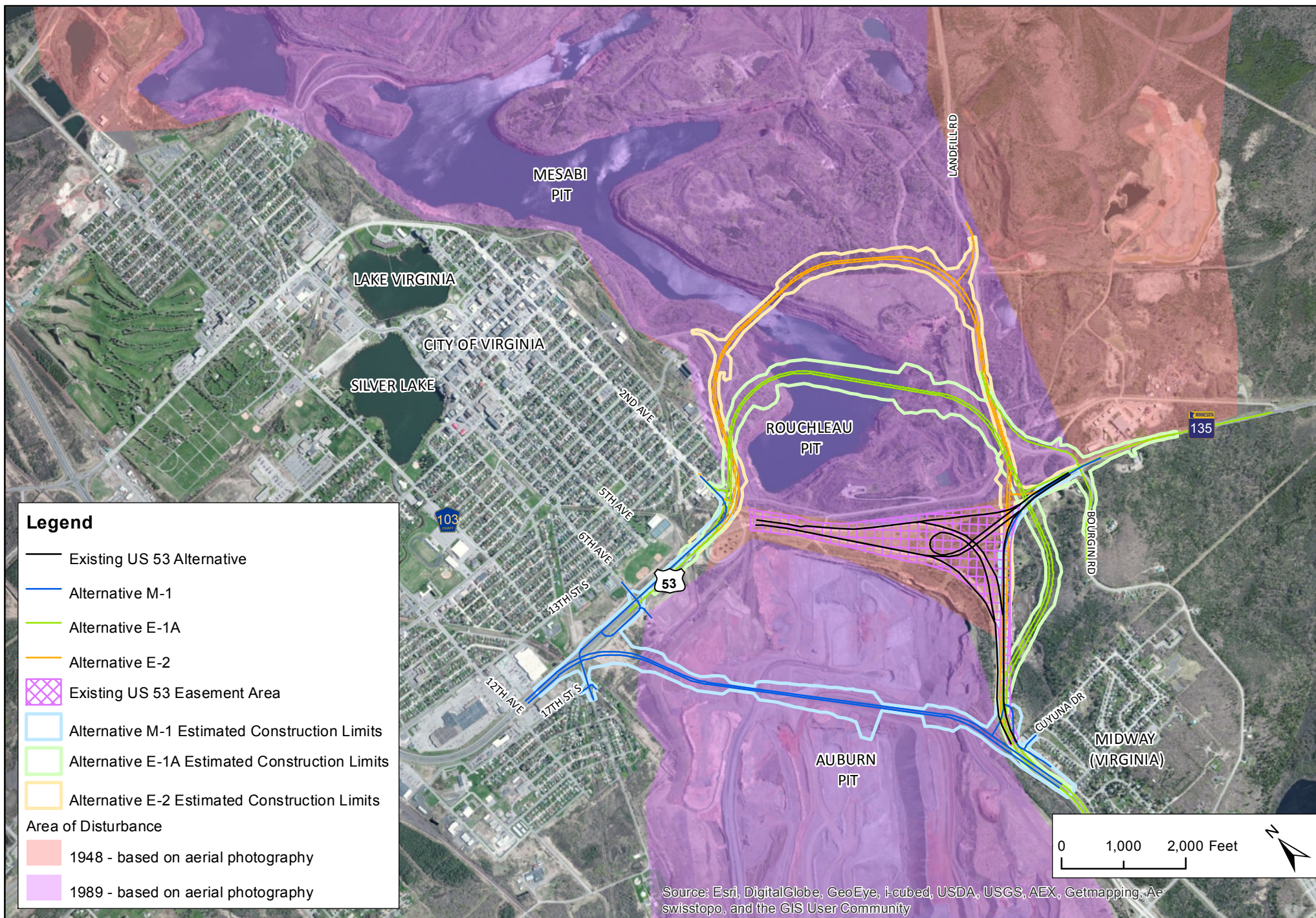


FIGURE 8 - Generalized Cross Section of a Bog

Appendix B

Aerial Photos Documenting Prior Disturbance



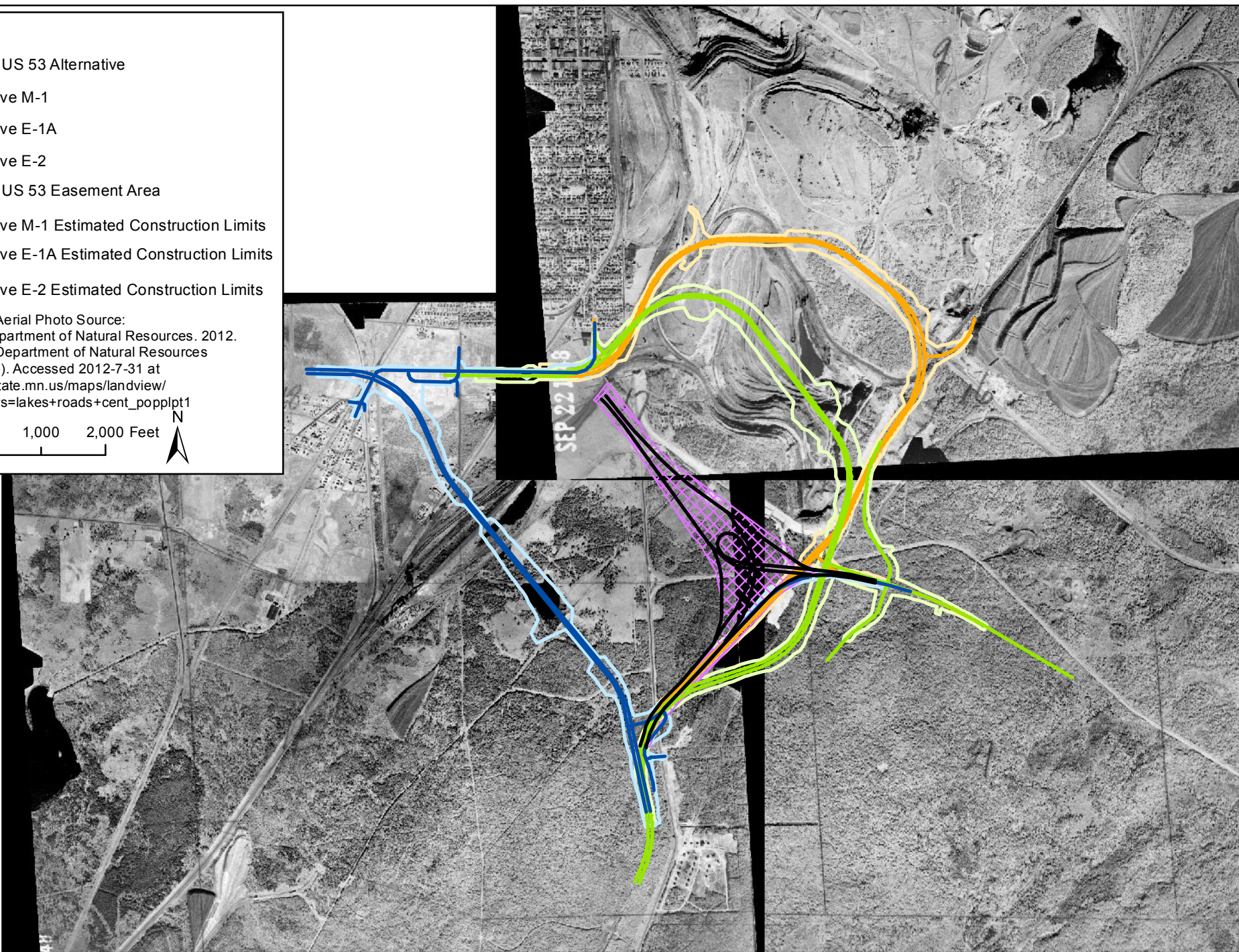
1948 and 1989 Aerial Photo Source:
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 The Minnesota Department of Natural Resources
 Web Site (online). Accessed 2012-7-31 at
http://www.dnr.state.mn.us/maps/landview/index.html?layers=lakes+roads+cent_poplpt1

Legend









- Existing US 53 Alternative
- Alternative M-1
- Alternative E-1A
- Alternative E-2
- Existing US 53 Easement Area
- Alternative M-1 Estimated Construction Limits
- Alternative E-1A Estimated Construction Limits
- Alternative E-2 Estimated Construction Limits

1948 and 1989 Aerial Photo Source:
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The Minnesota Department of Natural Resources
Web Site (online). Accessed 2012-7-31 at
http://www.dnr.state.mn.us/maps/landview/index.html?layers=lakes+roads+cent_popplt1

0 1,000 2,000 Feet



Legend

-  Existing US 53 Alternative
-  Alternative M-1
-  Alternative E-1A
-  Alternative E-2
-  Existing US 53 Easement Area
-  Alternative M-1 Estimated Construction Limits
-  Alternative E-1A Estimated Construction Limits
-  Alternative E-2 Estimated Construction Limits

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[http://www.dnr.state.mn.us/maps/landview/
index.html?layers=lakes+roads+cent_popplpt1](http://www.dnr.state.mn.us/maps/landview/index.html?layers=lakes+roads+cent_popplpt1)

